LIGHTING DATA

EDISON LAMP WORKS
OF GENERAL ELECTRIC COMPANY

GENERAL SALES OFFICE HARRISON, N. J.

Lighting for Indoor Recreations

Information compiled by

J. H. KURLANDER

Lighting Service Department

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SYNOPSIS: PAGE

For information regarding MAZDA lamps and lighting questions, refer to the nearest sales office.

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Introductory

The promotion of indoor recreation finds wider application each year. Man is continually devising new schemes for amusing himself in the moments when he is not absorbed in the all-important task of wresting a livelihood from the world. This phase of life has assumed such importance in our everyday affairs that special structures have been erected to house such places where relaxation is afforded. The average man concerns himself with his business during the day, and when night comes, casts about for some means of diverting himself from the day's labor.

He quite naturally seeks a place where he will feel at ease, be perfectly comfortable, and enjoy himself to the fullest extent. If he is athletically inclined, he probably plays a game of tennis with a neighbor or, perchance, he may belong to a bowling club, and, if so, may endeavor to keep his appendix in trim by musc1ing a sixteen pound ball all evening or, again, he may pick out a pool parlor with a view to testing his ability to cut a few shots in the side pocket. In any event, what he desires most of all is freedom amid congenial surroundings from the days of worries.

One may naturally wonder what the subject of lighting has to do with keeping a pleasure-seeking individual in a happy frame of mind, but a short perusal of the subject will serve to convince one that there is a direct relation between the two. Since indoor sport finds its greatest application in the evening, light other than that for mere seeing purposes should receive careful consideration.

An improperly designed lighting system, because of its conspicuousness both as to appearance and results, can easily spoil the effect of an otherwise perfectly appointed pool parlor, skating rink, etc. If the installation is glaring, it will make itself annoying to the patrons to such an extent as to detract seriously from their evening sport. If the light is not so distributed as to enable the player closely to follow up the plays or correctly to gauge distances, annoyance will again be the result. If the intensity is such as to require the players to make exceptional demands on their eyesight in order to follow the ball or hockey puck, nothing will be added to make their moods more cheery. A succession of such faults in the lighting installation may result in the patron's early departure.

Pool and Billiard Parlors

When considering the lighting requirements for pool and billiard tables, two important points must receive careful attention. These are a high intensity and extremely good diffusion. The necessity for this is easily seen from the fact that the playing area is rather

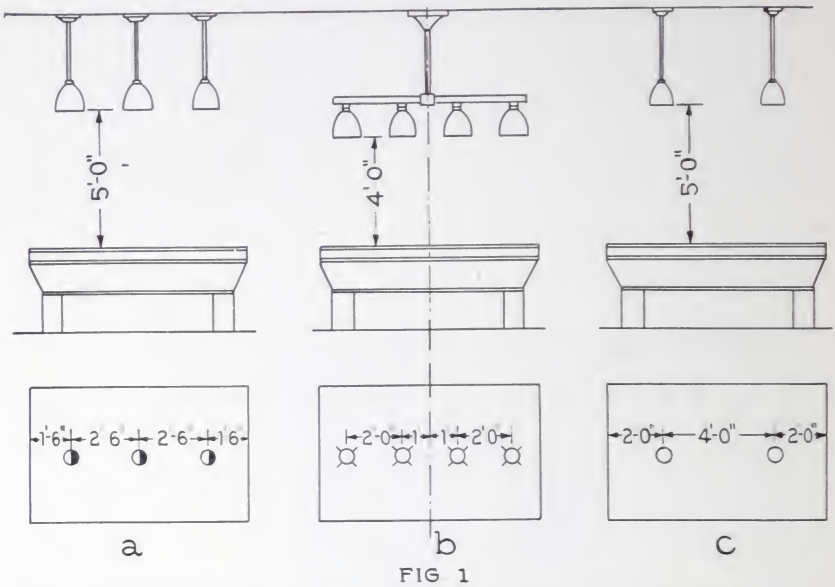

FIG 1

THREE COMMON METHODS OF LIGHTING BILLIARD TABLES · · ·

a= 3-75 watt bowl enameled Mazda "C" lamps in heavy density glass intensive type bowl reflectors.

b= 4-50 watt bowl frosted Mazda "B" lamps in heavy density glass intensive type bowl reflectors.

c= 2-100 watt bowl enameled Mazda "C" lamps in heavy density glass intensive type bowl reflectors

small and distances and angles must be carefully gauged. A shadow cast by a ball is very apt to mislead players in gauging distances, or otherwise disconcert them causing them to fumble the shot. No shadows cast by players standing in the immediate vicinity of the table should be allowed to fall on the table, unless these shadows are so soft as to be imperceptible.

There are three methods by means of which these requirements can be met in a satisfactory manner:

A Individual units located over each table supplemented by a low intensity of general illumination.

B Translucent reflectors placed over each table which serve both as local light for each table and general lighting for the entire room.

C A straight general system employing semi-indirect, indirect or enclosing diffusing units.

Individual lighting of tables is by far the most common. This is due no doubt to the fact that the grouping of low wattage lamps over tables in order to secure a desirable intensity was inaugurated before the advent of high wattage lamps. It is customary with this type of installation to use opaque deep bowl reflector

FIG. 2

View of a Hotel Pool Room Showing Lighting Installation Consisting of Three 40-watt MAZDA B Lamps in Copper Dome Reflectors Over Each Table. General lighting is provided by MAZDA lamps in indirect units. The white finish of the ceiling is a great aid in diffusing the light from these units, thus creating soft shadows

mounted approximately four or five feet above the table. Metal reflectors are best suited because no light is transmitted through them, with the result that little direct light reaches the eye.

With such a system, it is necessary to use some means of general illumination, as otherwise the room will be very gloomy and cheerless. Unless care is exercised in designing the installation and choosing the fixtures, the lighting system is apt to be unsightly.

The units should be hung high enough so that they do not interfere with a player's movements, and are not likely to be struck with

a cue. It is necessary for the reflectors to be of such type that the angle of cut-off of light from the lamp is fairly sharp and no direct light is permitted to enter the player's eyes. As stated before, a medium intensity of general illumination is necessary with such a system and this can best be obtained by using 100 or 200-watt MAZDA C lamps in indirect, semi-indirect or enclosing units, spaced to provide from one-quarter to one-half watt per square foot of floor area.

Fig. 1 shows three schemes for the local lighting of tables and Fig. 2 shows a night view where the local lighting is supplemented by general illumination of the indirect type. The construction of

FIG. 3

The Installation Shown in This Room Embodies the Features Necessary for Effective Billiard Table Illumination. The high intensity is provided by 300-watt MAZDA C lamps in totally indirect reflectors, over each table. The diffusion is excellent and the possibility of shadows from a part of the player's body is eliminated

these particular fixtures is interesting, all four units being served from one outlet.

Where translucent reflectors are employed, there is frequently no necessity for additional general lighting units. Special attention should be paid to the selection of the glass reflector as to size and type to eliminate the possibility of glare.

General lighting, properly installed, will give better results and present a neater appearance than a combination of local and general,

or purely local lighting. Three methods by means of which this may best be obtained are as follows:

Indirect Lighting
Semi-indirect Lighting
Enclosing Units

With the indirect system, because of the diffusely reflected light from the ceiling and walls, the placement of tables with regard to the lighting units is not important. Fig 3 shows such an installation This system, however, is inefficient, and there is a likelihood of lamps of too low wattage being used, resulting in a low intensity.

The semi-indirect system requires more careful placing of units with respect to tables in order to keep shadows short and soft Best

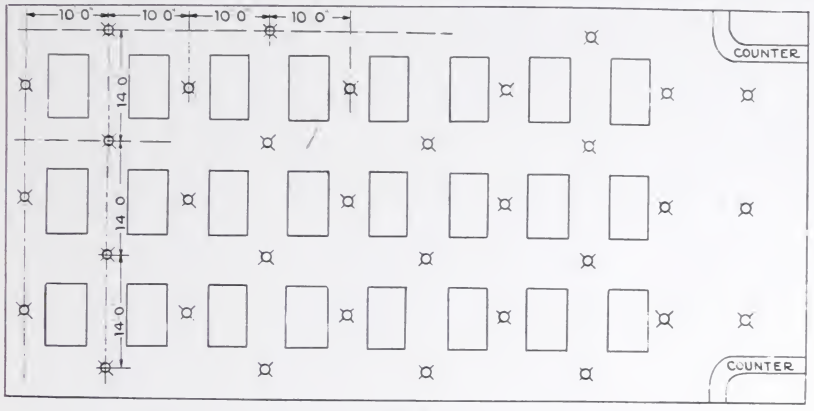

FIG 4

PLAN OF BILLIARD ROOM LIGHTING INSTALLATION
¤ = 300 watt Mazda C lamp in enclosing glassware

results are obtained with this system when a group of tables are to be lighted, as the units can then be so placed as to make tables receive predominating light from several directions.

While enclosing units diffuse the light to a certain extent, still most of the light received under such a system is direct light, and hence particular care must be used in placing the units so that objectionable shadows will not interfere with the player's aim Fig. 4 shows a method of locating units in order to obtain the desirable effect.

With totally indirect lighting, and with light surroundings, from 2.0 to 3.0 watts per square foot should be provided, with enclosing units from 1.5 to 2.0 watts per square foot are desirable; the value for semi-indirect lighting falling between these two and being dependent on the type of unit and room finish.

Bowling Alleys

The very nature of bowling is such that unless careful consideration is given to the proper shielding of light sources, it is very likely that the pastime cannot be carried on with any degree of enjoyment. Bowling alleys, by virtue of their construction, are long, narrow areas with comparatively low ceilings, which practically limit the spacing of outlets to the region above the alleys themselves, where the lighting units are most conspicuous. It is obvious that unless they are properly shielded, the resulting glare may be such as to render the player unable to aim effectively his ball.

The intensity on the alley itself should be fairly high, while at the end, on the pins, the intensity should be approximately double that on the alley. Deep bowl reflectors with 40 or 50-watt MAZDA lamps are often placed in a single line down the alley. In some cases the spacing between units is too great and the resultant illumination

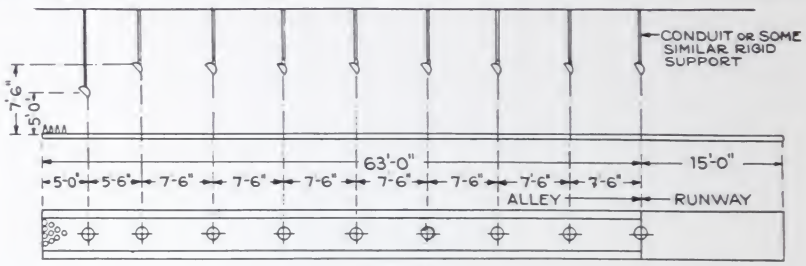

FIG. 5

STANDARD METHOD OF BOWLING ALLEY LIGHTING

⊕ = 40 watt Mazda B lamp in angle steel reflector

very uneven, creating light and dark areas or a striated effect, which proves very annoying. Then again, with an installation using deep bowl reflectors, the reflected glare from the polished floor surfaces is likely to prove troublesome.

The best method of obtaining an evenly distributed light on the surface of the bowling alley and a high intensity on the pins, free from glare or glaring reflections, is to utilize 40-watt MAZDA lamps in angle reflectors mounted in a single line over the center of the alley, as shown in Fig. 5.

When using this system, which is rapidly becoming standard, it is necessary to use conduit or some similar rigid support for the units, as otherwise they are likely to twist or turn, thus either throwing the light on a neighboring alley or else in the player's eye.

This system can be used for lighting two alleys, and when so

employed, outlets for 60 or 75-watt MAZDA lamps with the proper size angle reflectors should be spaced in a single line, midway between the two alleys, with individual units on each alley at the pins, as pictured in the night view in Fig. 6.

Indoor Tennis Courts

Indoor tennis is popular among those adherents of the game, as it is free from the vagaries of the weather and differences in seasons. The entire area housed by the structure should be lighted to a fairly

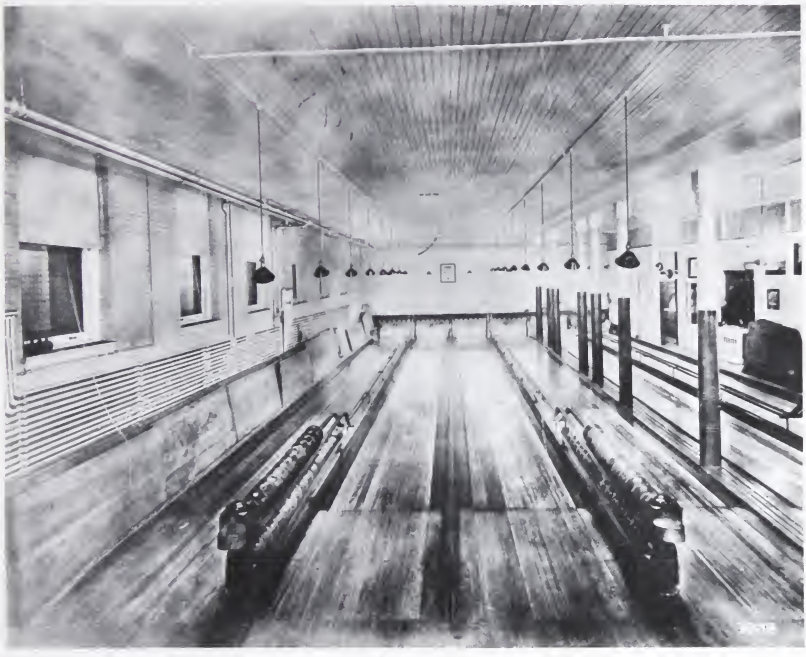

FIG. 6

Night View of a Bowling Alley Lighted by Angle Type Reflectors Total absence of glare with adequate intensity are inherent with such an installation

high intensity, and not only must the floor surface be lighted, but the units must be hung sufficiently high to enable a ball, traveling 20 feet in the air, to be clearly visible at all times. If the intensity is markedly uneven over the court, light and dark patches will be present and the ball in traveling from a lighter to a darker area will appear to slow down; conversely, when traveling from a darkened area to a lighter area, it will appear to gather speed. This apparent variation in the ball speed may render the player unable to gauge properly the speed of the ball in order to make a return. With con-

stant repetition, this will defeat the primary purpose of the lighting installation, which is to enable the game to be played as effectively at night as during the day. Glaring light sources will render the players more or less ineffective in making returns.

All three of the general systems of lighting are applicable to this problem The direct system is the most efficient, but, if it is not carefully designed, the installation may easily become glaring. The semi-indirect system can be applied where the wall and ceiling finish of the building is comparatively light in color, thus permitting a good portion of the light to be reflected from these surfaces. The totally indirect system can be applied only where the wall and ceiling finish is such as to have a high coefficient of reflection. This

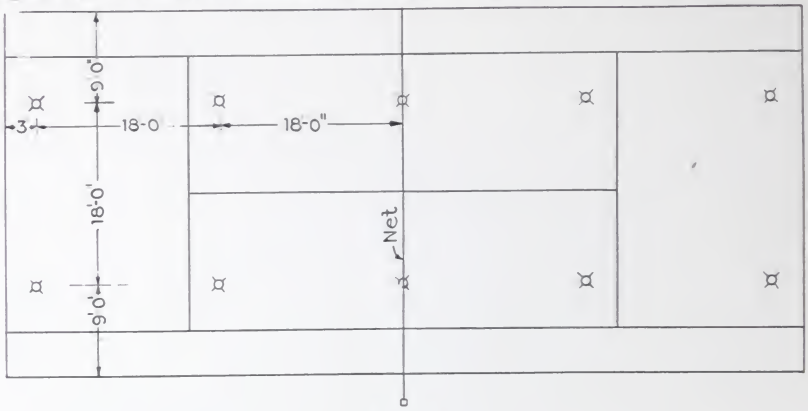

FIG 7

PLAN OF TENNIS COURT SHOWING LOCATION OF LIGHTING UNITS

¤=500 watt Mazda C lamp in semi-indirect or enclosing diffusing globe

NOTE Minimum hanging height 20 feet

system gives the best diffusion with little or no likelihood of glare. It is the most inefficient and approximately double the wattage is required that is needed for a direct lighting system.

For all practical purposes, enclosing or semi-enclosing diffusing units are to be recommended, where the ceiling height is 25 feet or more. High wattage MAZDA C lamps placed on wide centers are preferable to low wattage lamps more closely spaced, as there is less likelihood of several units being in the field of view. Light colored walls and ceilings will eliminate any difficulty with uneven lighting.

Where a ceiling height of approximately 25 feet is obtainable, a system similar to the one shown in Fig. 7 can be used to good advantage. In Fig. 8 is shown a night view of this installation.

Squash Courts

The principal requirements for lighting a squash court are a high intensity, good diffusion and absence of glare. The game of squash calls for rapid play with close attention, inasmuch as the movements of a small ball must be closely followed.

The room in which this game is played varies from 50 to 30 feet in length, and from 20 to 15 feet in width. The walls and floor are hard and smooth. There are usually two finishes applied to the walls and ceiling. In some cases a dark finish, such as mahogany, is used in conjunction with a white ball, so as to get the proper contrast between ball and walls.

FIG. 8

Night View of a Tennis Court Showing Lighting Effects Obtainable with a Combination of Semi-indirect and Totally Indirect Lighting The white finish of the ceiling adds materially in obtaining good diffusion and the dark green finish of the walls relieves the contrast and tends to prevent eyestrain Eight 750-watt MAZDA C lamps are used

In other cases, particularly in England, the walls are painted a flat white and a black ball is used. It is evident from this that the dark finished court makes the greatest demand on the lighting installation inasmuch as it possesses a very low reflection factor. In Fig. 9 is shown a night view of such a court and the data pertaining to this particular court are very interesting.

Had the English practice of painting the walls white and using

a black ball been resorted to, it is safe to assert that the wattage could easily have been cut in half, and even then the intensity would have been in the neighborhood of 12 foot-candles.

Occasionally the construction of the ceilings of these courts is such as to permit the hanging of deep bowl direct lighting units, so as to conceal them from view, save when looking directly upwards. That is, they can be hung along side of drop beams. In other cases, it is possible to set these so that the mouth of the reflector is flush with the ceiling and provide a slight metal shield on the side generally faced by the players. Angle reflectors are scarcely suitable,

FIG. 9

Night View of a Squash Court Lighted by Eight 400-watt MAZDA C Lamps in Opalescent Semi-enclosing Units. The wattage consumption is 5.55 watts per square foot and the intensity is approximately 10 foot-candles. The dark finish of the walls and ceiling account for the relatively low intensity

for the play is likely to progress on all sides and unsymmetrical distribution of light is not effective.

Where the fixture must be in full view, semi-enclosing units of the diffusive and decorative type find use as pictured. The precaution must always be taken of carefully guarding the glassware from balls struck upwards. As mentioned, the power required properly to light the court will vary with the room finish. From three to four watts per square foot with the deep bowl direct lighting installation, in a darkly finished room, will prove satisfactory, while with the enclosing units, under the same conditions, upwards of five watts

per square foot is necessary. With light surroundings the values can be greatly decreased.

Skating Rinks

Of all indoor recreations that of ice skating meets with most popular favor. This is so because the sport is not limited to a small number of people and there is practically no age barrier.

The pleasure afforded is nearly equivalent to that of outdoor skating and in many ways ice skating is more to be preferred

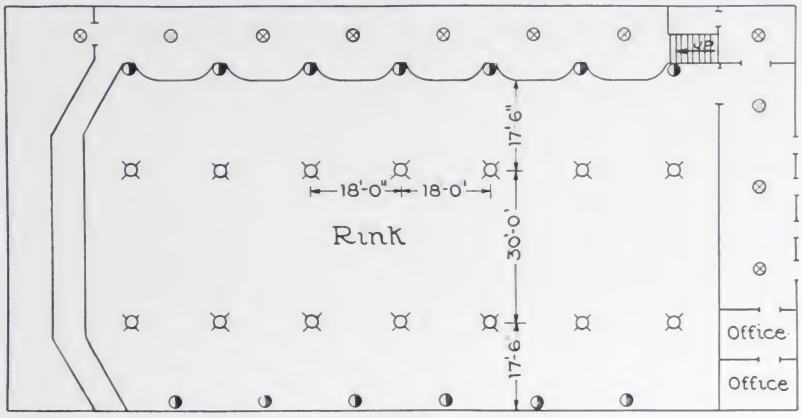

FIG 10

PLAN OF ICE SKATING RINK

¤ = 300 watt Mazda "C" lamp in semi-indirect unit
⊗ = 75 watt Mazda "C" lamp in semi-indirect unit
◑ = 3-25 watt Mazda "B" lamps, wall-bracket

inasmuch as its enjoyment is not dependent on weather conditions.

When considering the lighting of skating rinks, two types come to mind—one, purely utilitarian, non-decorative, for use in such rinks as are devoted mostly to hockey playing and similar contests; the other less efficient, more decorative, harmonizing and blending with the finish and appointment of the rink. In the first type, as stated before, the primary consideration is adequate diffusion. In a hockey game, the shadows cast by the players, either when separated or in a scrimmage, must not be dense enough to cause the players to lose track of the hockey puck.

If direct lighting is to be employed, it is necessary to space outlets quite closely together to eliminate any shadow difficulties. In choosing the type of reflector, we must consider the question of efficiency, appearance and cost. Bowl enameled MAZDA C lamps in

RLM Standard Dome reflectors or clear MAZDA lamps in deep bowl mirrored glass reflectors represent one extreme, diffuse enclosing units the other. A practice which has much in its favor is the use of dense opal deep bowl reflectors, transmitting some light to the ceiling, permitting a fairly ornamental appearance, and yet relatively effective in redirection of light.

The size of lamp to be used will vary somewhat with the ceiling height. For ceiling height of 20 feet or under, 100-watt MAZDA C

FIG. 11

Night View of an Indoor Ice Skating Rink. The rink proper is lighted by 300-watt MAZDA C lamps in semi-indirect reflectors, spaced on 30 by 18 foot centers and hung 20 feet high. The walls and ceiling are finished in light gray with white trim. The diffusion is very good and the intensity is in the neighborhood of six foot-candles

lamps, heavy density opal glass reflectors, spaced approximately on 10 by 10 foot centers, will provide a good intensity on the rink, together with a high degree of diffusion. Where the ceiling height ranges between 20 and 30 feet, 200-watt bowl enameled MAZDA C lamps in the same type of reflector spaced on 15 by 15 foot centers will provide approximately the same intensity.

Where rinks are employed purely for general skating purposes in large cities, they should be well appointed and

critical attention given to their interior finish. The lighting of these rinks must be necessarily of a more ornamental character in order to harmonize with the surroundings. The intensity here need not be so high as that required on rinks devoted to skating contests. Diffusion, however, must be of a fairly high degree inasmuch as exhibition matches are sometimes staged which necessitate comparative freedom from dense shadows.

The two systems which work out best for this service and are commonly employed, are the semi-indirect and enclosing unit systems. The diffusion under each is very good, and a fairly high intensity can be obtained at a reasonable consumption of power.

The pleasing effects obtainable with such a system can easily be seen from an inspection of Fig. 11, which shows a spendidly appointed rink lighted by high wattage MAZDA C lamps in semi-indirect units. This is a fairly representative installation and the data given in the plan, Fig. 10, will serve as a guide in design.

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